This document includes Section 13.0, CB M Class: Spark Ignition Outboard Vessels Less than 30 Feet in Length and Utility Boats, of the Draft EPA Report “Surface Vessel Bilgewater/Oil Water Separator Feasibility Impact Analysis Report” published in 2003. The reference number is: EPA-842-D-06-019

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Section 13.0 – CB M Class: Spark Ignition Outboard Vessels Less than 30 Feet in Length and Utility Boats

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SECTION 13.0 – CB-M CLASS

TABLE OF CONTENTS

13.0 CB-M CLASS **1**
13.1 COLLECTION, HOLDING, AND TRANSFER **2**
13.1.1 Practicability and Operational Impact Analysis 2
13.1.2 Cost Analysis 3
13.2 CENTRIFUGE **5**
13.3 EVAPORATION **5**
13.4 GRAVITY COALESCENCE **5**
13.5 HYDROCYCLONES **5**
***13.6 IN SITU* BIOLOGICAL TREATMENT** **6**
13.7 OIL ABSORBING SOCKS **6**
13.8 FILTER MEDIA **6**
13.9 MEMBRANE FILTRATION **6**

LIST OF TABLES

Table 13-1. CHT Annual Labor Hours (CB-M Class) 3
Table 13-2. Annual Recurring Costs for CHT (CB-M Class) 4
Table 13-3. TOC for CHT (CB-M Class) 5

13.0 CB-M CLASS

The U.S. Coast Guard's CB-M Class of boats was selected to represent the group of boats powered by outboard spark ignition (SI) engines. The CB-Ms, or medium size cutter boats, are rigid hull inflatable boats (RIBs) that are carried on-board larger USCG platforms (e.g., 75' WLR, 87'/110' WPB, 140' WTGB, 133'/157'/175' WLM, 270' WMEC, and 180' WLB Class) (Navy and EPA, 2003). There are 59 vessels within the CB-M vessel class. The length of these boats varies between 17 and 21 feet, however, under the cutter boat replacement project initiated in 1997, older CB-Ms are being replaced with RIBs having a standard length of 18 feet (Navy and EPA, 2003). Because these boats operate from larger USCG cutters, they spend much of their time out of water. Some of the host ships operate primarily beyond 12 nautical miles (nm) from shore, while others operate mostly in inland waters and within 12 nm from shore. Depending on the type of vessel a CB-M is assigned to, the nature of operations can vary drastically in both location (within and beyond 12 nm) and duration (e.g., multiple operations every day to a single operation every two or three days). Additionally, the operating duration of each CB-M can vary in length depending on the nature of the "mission" (e.g., from as little as one hour for a simple fishery inspection up to six hours for a migrant related boarding). Because these boats are typically kept out of the water when not in use, for the purposes of this analysis, their "in port" bilgewater generation rate is assumed to be 0 gallons per day (gpd). The generation of bilgewater while underway will vary because it is dependent upon ambient conditions (sea spray, rain, greenwater, etc.) and compartment gasket integrity. For this analysis the bilgewater generation rate is assumed to be 2 gpd. CB-M Class boats spend approximately 70 days each year operating within 12 nm from shore and generate approximately 140 gallons of bilgewater per year.

$$\frac{70\,\text{days}}{\text{year}} \bullet \frac{2\,\text{gal}}{\text{day}} = 140\,\text{gal/year}$$

The CB-M Class vessels have a combined open working deck and bilge area where accumulations of water (from sea spray, rain, green water, etc,) can drain to a gravity self-draining scupper system that drains through the transom via one-way flapper scuppers which act as check valves. Water that collects and drains in this manner is considered deck runoff, which is discussed in the Deck Runoff Characterization Report.

Some vessels within the CB-M vessel group may have weather-tight compartments that have the potential to accumulate bilgewater if they are not adequately sealed. These compartments are broken into two groups:

- *Storage Compartments:* These weather-tight compartments are typically used to store equipment (e.g., life jacket lockers, boat lines, etc) that has little potential to contaminate the water that could accumulate in the compartment. Water that collects in these compartments is deck runoff that leaks through the weather-tight seal. Therefore, water in these compartments is considered deck runoff.

- *Fuel System Access Compartments:* These weather-tight compartments provide access to fuel line connections, lubricated steering cables, oil injection tanks, and/or fuel tanks. These compartments may contain constituents (e.g., oil, fuel) that could contaminate the bilgewater.

There are no oil water separating systems installed aboard CB-M Class boats. Collection, holding, and transfer (CHT); centrifuge; evaporation; gravity coalescence; hydrocyclone; *in situ* biological treatment; oil absorbing socks (OASs); filter media; and membrane filtration marine pollution control device (MPCD) options are evaluated for CB-M Class boats that possess fuel system access compartments.

13.1 COLLECTION, HOLDING, AND TRANSFER (CHT)

The following sections discuss the feasibility and cost impacts of practicing CHT on-board vessels within the CB-M Class vessel group that have the potential to accumulate water in fuel system access compartments.

13.1.1 Practicability and Operational Impact Analysis

This section analyses specific feasibility criteria relative to the physical characteristics and operational requirements of CHT.

13.1.1.1 Space and Weight

The average length of a mission for these boats generally will not exceed six hours. The volume of bilgewater that would accumulate in weather-tight compartments during this length of time is approximately 2 gallons and would not result in any measurable impacts to space and weight, or pose a hazard to the operation of the boat.

13.1.1.2 Personnel/Equipment Safety

Practicing CHT does not pose any safety hazards to the boat’s crew or equipment.

13.1.1.3 Mission Capabilities

Practicing CHT on these vessels should not have an impact on a boat’s mobility, or on any mission critical systems or operations.

13.1.1.4 Personnel Impact

Practicing CHT as a primary control option does not require special training. One crewmember is needed to offload any bilgewater that accumulates in the weather-tight compartments. Although, some vessels within the vessel group may be equipped with bilge pumps, buckets and sponges would be used to transfer the bilgewater when in port. The bilge pumps are intended for emergency dewatering purposes only and do not have shore connections necessary for transferring bilgewater to shore facilities.

Each CB-M Class boat generates approximately 140 gallons of bilgewater annually within 12 nm. Although the operational characteristics of boats within the vessel group vary, the amount of bilgewater produced by the CB-M Class boat was assumed to be representative of vessels within the group. These vessels operate beyond 12 nm of shore for only a small portion of each year. As a consequence of very limited operation beyond 12 nm and low bilgewater generation rate, the amount of bilgewater that is generated while operating beyond 12 nm is considered negligible. The small amount of bilgewater that is generated while the boats are operating beyond 12 nm is included in the volume calculated for operations within 12 nm of shore.

Assuming it takes one crewmember approximately 15 minutes to transfer the average amount of bilgewater generated daily (2 gallons) using a bucket and sponge, a total of 18 hours per year are required to offload the bilgewater, as calculated below:

$$\frac{70\,\text{days}}{\text{year}} \bullet \frac{0.25\ \text{hrs}\,\text{labor}}{\text{day}} = 18\ \text{hrs}\,\text{labor/yr}$$

No maintenance is required to perform CHT. Table 13-1 provides the annual labor hours required to perform CHT.

Table 13-1. CHT Annual Labor Hours (CB-M Class)

	MPCD Option: CHT
Operator Hours Within 12 nm	18
Operator Hours Beyond 12 nm	-
Condition-based Maintenance Within 12 nm	0
Condition-based Maintenance Beyond 12 nm	-
Time-based Maintenance	0
Total Time	18

13.1.1.5 Consumables, Repair Parts, and Tools

There are no requirements for consumables, repair parts, or tools associated with CHT.

13.1.1.6 Interface Requirements

Practicing CHT does not require any unique interfaces. As previously explained, bilgewater that accumulates in these vessels would be transferred to shore using buckets and sponges.

13.1.1.7 Control System Requirements

There are no automated control system requirements associated with CHT.

13.1.1.8 Other/Unique Characteristics

No other/unique characteristics have been identified with respect to this MPCD option.

13.1.2 Cost Analysis

The following cost data and calculations are provided to allow the reader to compare costs associated with a CHT system.

13.1.2.1 Initial Cost

Practicing CHT within 12 nm does not require any equipment or boat modifications. Therefore, the initial cost of practicing CHT is assumed to be zero.

13.1.2.2 Recurring Cost

The MPCD requires 18 personnel hours per year for transfer of bilgewater to shore, as explained under Section 13.1.1.4. The annual labor hours multiplied by the $22.64 per hour MPCD operator labor rate produces the annual recurring labor cost of approximately $400.

$$\frac{\$22.64}{\text{hr}} \bullet \frac{18\text{ hrs}}{\text{yr}} = \$400\text{ /yr}$$

The annual bilgewater generation rate within 12 nm is 140 gallons. Multiplying the volume of bilgewater generated annually within 12 nm by the oily waste disposal unit cost produces an annual recurring disposal cost for CHT of $10.

$$\frac{140\text{ gal}}{\text{yr}} \bullet \frac{\$0.0749}{\text{gal}} = \$10\text{/yr}$$

The bilgewater generated annually within 12 nm multiplied by the oily waste disposal unit cost for Coast Guard boats produces the annual recurring disposal cost for CHT of $127.

$$\frac{140\text{ gal}}{\text{yr}} \bullet \frac{\$0.91}{\text{gal}} = \$127\text{/yr}$$

Table 13-2 summarizes the annual recurring costs of practicing CHT.

Table 13-2. Annual Recurring Costs for CHT (CB-M Class)

Vessel Operating Parameter	Disposal Cost Used	Annual Recurring Cost ($K)
Within 12 nm	Other Military Services	0.407
Beyond 12 nm	Other Military Services	-
Within 12 nm	Coast Guard	0.524
Beyond 12 nm	Coast Guard	-

13.1.2.3 Total Ownership Cost (TOC)

Table 13-3 summarizes the TOC and annualized cost over a 15-year lifecycle of practicing CHT.

Table 13-3. TOC for CHT (CB-M Class)

Cost ($K)	Other Military Services Vessel Operation Within 12 nm	Other Military Services Vessel Operation Within + Beyond 12nm	USCG Vessel Operation Within 12 nm	USCG Vessel Operation Within + Beyond 12nm
Total Initial	0.0	0.0	0.0	0.0
Total Recurring	4.5	4.5	5.8	5.8
TOC (15-yr lifecycle)	4.5	4.5	5.8	5.8
Annualized	0.4	0.4	0.5	0.5

13.2 CENTRIFUGE

Based on a review of the CB-M Class design and operational characteristics, these vessels cannot provide the electrical power and potable water required to operate a centrifuge system (Navy, 2000). In addition, adequate space is not available on CB-M Class vessels to accommodate a centrifuge system (Navy, 2000). Therefore, the use of centrifuges is infeasible and no further analysis will be conducted with regard to the use of centrifuges on CB-M Class vessels.

13.3 EVAPORATION

Based on a review of the CB-M Class design and operational characteristics, these vessels cannot provide the electrical power required to operate an evaporation system (Navy, 2000). In addition, adequate space is not available on CB-M Class vessels to accommodate the installation of an evaporation system (Navy, 2000). Therefore, the use of evaporation is infeasible and no further analysis will be conducted with regard to the use of evaporators on CB-M Class vessels.

13.4 GRAVITY COALESCENCE

Based on a review of the CB-M Class design and operational characteristics, these vessels cannot provide the electrical power required to operate a gravity coalescer (Navy, 2000). In addition, adequate space is not available on CB-M Class vessels to accommodate the installation of a gravity coalescence system (Navy, 2000). Therefore, the use of gravity coalescence is infeasible and no further analysis will be conducted with regard to the use of gravity coalescence units on CB-M Class vessels.

13.5 HYDROCYCLONES

Based on a review of the CB-M Class design and operational characteristics, these vessels cannot provide the compressed air required to operate a hydrocyclone (Navy, 2000). In addition, adequate space is not available on CB-M Class vessels to accommodate the installation of a hydrocyclone system (Navy, 2000). Therefore, the use of hydrocyclones is infeasible and no further analysis will be conducted with regard to the use of hydrocyclones on CB-M Class vessels.

13.6 *IN SITU* BIOLOGICAL TREATMENT

In Situ biological treatment of bilgewater is the addition of microbes to a boat's bilge spaces to digest the oil content of the bilgewater. For *in situ* biological treatment to be effective, the microbes must be left in the bilge for a sufficient period of time to digest the bilgewater's oil content. According to the vendor, the most effective use of *in situ* biological treatment of bilgewater is to leave the treatment material in the bilge spaces on the boat for a 30-day period to establish a population of microbes and to provide sufficient time to metabolize the hydrocarbon constituents of the bilgewater (Opsanick, 2000). *In situ* material could be left in the bilge spaces to reduce the oil content of any bilgewater that may collect in the fuel system access compartments. However, CB-M Class boats practice CHT without significant cost or operational impacts. Because CHT prevents the discharge of bilgewater, *in situ* biological treatment would not provide any additional benefit. Therefore, no further analysis will be performed for the *in situ* biological treatment MPCD option.

13.7 OIL ABSORBING SOCKS (OASS)

OASs are designed to absorb oil found floating on the surface of a body of water (Sorbent Products, Inc., 2000). For vessels within the vessel group that have weather-tight compartments with the potential to accumulate bilgewater, OASs may be used where practical. However, CB-M Class boats practice CHT without significant cost or operational impacts. Because CHT prevents the discharge of bilgewater, OASs would not provide any additional benefit. Therefore, no further analysis will be performed for the OAS MPCD option.

13.8 FILTER MEDIA

Although some boats in the CB-M vessel group are equipped with hand-operated or automatic bilgepumps, CB-M Class boats practice CHT without significant cost or operational impacts. Because CHT prevents the discharge of bilgewater, the use of filter media would not provide any additional benefit. Therefore, no further analysis will be performed for the filter media MPCD option.

13.9 MEMBRANE FILTRATION

Based on a review of the CB-M Class design and operational characteristics, these vessels cannot provide the electrical power required to operate a membrane filtration system (Navy, 2000). In addition, adequate space is not available on CB-M Class vessels to accommodate the installation of a membrane filtration system (Navy, 2000). Therefore, the use of membrane filtration is infeasible and no further analysis will be conducted with regard to the use of membrane filtration systems on CB-M Class vessels.